

Beche, Fitton, Sedgwick, and Murchison, down to the present day, there had always been perfect harmony in the Club. He further congratulated the younger men not only on the zeal and talent displayed among them, but on the progress of opinion and freedom of expression gained by scientific thought in the course of half a century.

ICEBERGS are reported to have been met with in the Bay of Biscay during very rough weather, by the *Mongolia*, which arrived at Southampton on Monday last. Icebergs have been met with as far south, but generally well out in the Atlantic Ocean.

We invite the attention of all interested in technical education to the very excellent examination scheme of the Society of Arts, intended to promote such education among the working men of the country. No doubt a prospectus of the scheme will be forwarded to anyone writing for it to the Society's offices in London.

IN one of its last sittings the Municipal Council of Paris will have to vote on a proposition, supported by forty of its members, asking the National Assembly to establish a system of public instruction, gratuitous, obligatory, and secular. The motion will probably be agreed to by the Municipal Council, but rejected altogether by the National Assembly.

THE additions to the Zoological Society's Gardens during the past week include eighteen Lancelets (*Amphioxus lanceolatus*) from the Mediterranean Sea, presented by the Director of the zoological Station at Naples; a Pine Marten (*Martes abietum*), British, presented by Mr. J. Francis; a Red-shouldered Starling (*Agelaeus phoeniceus*) from N. America, presented by Mrs. Boxwell; two Aztec Conures (*Conurus aztec*) from S. America, purchased.

SOCIETIES AND ACADEMIES

LONDON

Linnean Society, Nov. 5.—G. J. Allman, M.D., president, in the chair.—W. H. Archer, R. A. Pryor, and W. W. Wilson were elected Fellows. Mr. J. E. Howard read a paper on the appearances of *Lobelia dortmanna* on the floating island in Derwentwater.—Mr. J. A. Jackson exhibited leaves of *Liquidambar* and *Perottia*, exhibiting remarkably beautiful autumn tints.—Mr. J. G. Baker read a paper on Asparagaceæ, a section of Liliaceæ. The author commenced by discussing the limits of the natural order Liliaceæ. He proposed to regard it as consisting of three great series, and in addition several abnormal tribes, all of which have some claim to be regarded as distinct orders. The three series are:—Liliaceæ proper, characterised by capsular fruit with loculicidal dehiscence, united styles, and introrse anthers (1200 to 1300 species); Colchicaceæ, marked by capsular fruit with septicidal dehiscence, free styles, and extrorse anthers (130 species); and Asparagaceæ, marked by baccate fruit (260 species). The aberrant tribes are Liriopeæ (Ophiopogoneæ), Gillesieæ, Conantheræ, Stemoneæ (Roxburghiaceæ, Lindley), and Scillopeæ. All these have anatropous ovules; and he advocated the separating of *Smilax* from Asparagaceæ, with which it has been commonly joined by recent writers, and the retention of it as the type of a separate order marked by orthotropous ovules, and by its habit of growth, woody often prickly stems, minute polygamous umbellate flowers, stipular tendrils, and decidedly stalked exogen-like leaves with venules reticulated between the palmate main nerves. The tribes and genera of Asparagaceæ, which are as follows, to a considerable extent represent the non-bulbous tribes of the two capsular series:—(1) *Dracaceæ*: Shrubs with proper leaves, hermaphrodite flowers, and introrse anthers; genera, *Dracena*, *Toetsea* (= *Cordyline*, but used on ground of priority), and *Colmia*; represents *Yuccoideæ* in Euliliaceæ. (2) *Sansevieræ*: Undershrubs with coriaceous-carnose leaves, hermaphrodite flowers, and extrorse anthers; genera, *Sansevieria*, *Lomatophyllum*; represents closely *Aloineæ* in Euliliaceæ. (3) *Convallariæ*: Herbs with proper leaves, gamophyllous hermaphrodite flowers, and introrse anthers; genera, *Reineckia*, *Convallaria*, *Polygonatum*, *Hylonomæ*; represents *Hemerocallidæ* in Euliliaceæ. (4) *Tovariæ*:

Herbs with proper leaves, polyphyllous hermaphrodite flowers, and introrse anthers, dehiscing longitudinally; genera, *Theropogon*, *Speirantha* (new genus founded on *Albica gardeni*, Hook.), *Maianthemum*, *Tovaria* (an earlier name for *Smilacina*), *Drymophila*, *Geitonoplesium*, and *Eustrephus*. (5) *Dianellæ*: Herbs with proper leaves, hermaphrodite flowers, and anthers dehiscing by terminal pores; genera, *Dianella*, *Luzuriaga*. (6) *Aspidistree*: Acaulescent herbs, with fleshy, often eight-lobed perianths, hermaphrodite flowers, introrse anthers with longitudinal dehiscence, and large peltate complicated stigmas; genera, *Aspidistra*, *Plectogyne*, *Tupistra*, *Campylandra* (new genus from East Himalayas), *Gonioscypha* (new genus from Bhotan), *Rohdea*. (7) *Streptopææ*: Herbs with proper leaves, hermaphrodite flowers, and extrorse anthers, with longitudinal dehiscence; genera, *Medcola*, *Clintonia*, *Prosartes*, *Streptopus*, *Callixene*, *Kruhsea*; represents *Colchicaceæ* in the capsular series. (8) *Asparagææ*: Herbs or shrubs with leaves degraded down into spurred bract-like membranes, and their place filled by an abundant development of branches in their axils; flowers often polygamous, with introrse anthers dehiscing longitudinally; genera, *Asparagus* (including *Asparagopsis* and *Myrsiphyllum*), *Ruscus*, *Semele*, and *Danae*; the most specialised type of the baccate series, not represented by any tribe in the two capsular sets. The most noticeable points of structure in the series are that, in the first place, such a thing as a bulbous rootstock or a narrow fleshy lorate leaf of the hyacinth type does not occur in Asparagææ at all. As regards distribution, it is noticeable that whilst the bulbous tribes of Liliaceæ possess a distinctly-marked geographical individuality, this does not hold good of the non-bulbous half of the natural order; and that the 260 species are scattered all over the world, and not concentrated in any particular geographical area. The most curious structural peculiarity in the group is the degradation of the leaf-organ which marks the tribe Asparagææ. The leaves have an alternate arrangement, and are invariably developed in the form of a minute membranous scale. This has a spur at the base, which in many of the shrubby species of *Asparagus* is developed out into a woody spine, as firm in texture as the indurated branchlet of the sloe or hawthorn. The function of the leaf is fulfilled by branches, which are developed singly, or in fascicles in the axils of these bract-like proper leaves. Sometimes these branches are needle-like (cladodia), without any flattening, as in the common garden asparagus; and sometimes, as in *Myrsiphyllum* and *Ruscus*, they assume all the appearance of proper leaves (phyllodia). The flowers in the 100 species of the genus *Asparagus* are remarkably uniform, and it is principally upon characters furnished by the shape and arrangement of these barren branches that the species are marked. The stigma of the *Aspidistree* is a very curious and complicated organ. It is a plate with eight troughs radiating from a raised central umbilicus, separated from one another by raised walls, and it closes in the tube of the perianth, in which the anthers are placed so thoroughly that it is difficult to tell how fertilisation is effected; but upon turning it upside down four minute holes may be seen, through which it would be possible for a very small insect to creep. The paper was illustrated by plates of the three new genera, and one to show the structure of the stigma of these *Aspidistree*; and a large number of new species, especially in the genus *Asparagus*, were described. In the discussion which followed, Dr. Hooker, Dr. Masters, and others expressed their sense of the great value of Mr. Baker's labours.

Geological Society, Nov. 4.—John Evans, F.R.S., president, in the chair.—The following communication was read:—Notes on the Comparative Microscopic Rock-structure of some Ancient and Modern Volcanic Rocks, by J. Clifton Ward. The author stated at the outset that his object was to compare the microscopic rock-structure of several groups of volcanic rocks, and in so doing to gain light, if possible, upon the original structure of some of the oldest members of that series. The first part of the paper comprised an abstract of what had been previously done in this subject. The second part gave details of the microscopic structure of some few modern lavas, such as the Solfatara Trachyte, the Vesuvian lava-flows of 1631 and 1794, and a lava of the Alban Mount, near Rome. In the trachyte of the Solfatara acicular crystals of felspar show a well-marked flow around the larger and first-formed crystals. In the Vesuvian and Albanian lavas leucite seems, in part at any rate, to take the place of the felspar of other lavas; and the majority of the leucite crystals seem to be somewhat imperfectly formed, as is the case with the small felspar prisms of the Solfatara rock

The order of crystallisation of the component minerals was shown to be the following:—Magnetite, felspar in large or small distinct crystals, augite, feldspathic or leucitic solvent. Some of the first-formed crystals were broken and rendered imperfect before the viscid state of igneous fusion ceased. Even in such modern lava-flows as that of the Solfatara considerable changes had taken place by alteration and the replacement of one mineral by another, and is very generally in successive layers corresponding to the crystal outlines. The frequent circular arrangement of the glass and stone cavities near the circumference of the minute leucite crystals in the lava of 1631 was thought to point to the fact that after the other minerals had separated from the leucitic solvent, the latter began to crystallise at numerous adjacent points; and as these points approached one another, solidification proceeded more rapidly, and these cavities were more generally imprisoned than at the earlier stages of crystallisation. In the example of the lava of 1794, where the leucite crystals were further apart, this peculiar arrangement of cavities was almost unknown. The third part of the paper dealt with the lavas and ashes of North Wales; and the author thought that the following points were established:—1. Specimens of lava from the Arans, the Arenigs, and Snowdon and its neighbourhood, all have the same microscopic structure. 2. This structure presents a hazy or milky-looking base, with scattered particles of a light-green dichroic mineral (chlorite), and generally some porphyritically imbedded felspar crystals or fragments of such, both orthoclase and plagioclase. In polarised light, on crossing the Nicols, the base breaks up into an irregularly coloured breccia, the colours changing to their complementaries on rotating either of the prisms. 3. Finely bedded ash, when highly altered, is in some cases undistinguishable in microscopic structure from undoubted felstone. 4. Ash of a coarser nature, when highly altered, is also very frequently not to be distinguished from felstone, though now and then the outlines of some of the fragments will reveal its true nature. 5. The fragments which make up the coarser ash-rocks seem generally to consist of felstone, containing both orthoclase and plagioclase crystals or fragments; but occasionally there occur pieces of a more crystalline nature, with minute acicular prisms and plagioclase felspar. 6. In many cases the only tests that can be applied to distinguish between highly altered ash-rock and a felstone are the presence of a bedded or fragmentary appearance on weathered surfaces, and the gradual passage into less altered and unmistakable ash. In the fourth division of his paper the author described some of the lavas and ashes of Cumberland of Lower Silurian age. With regard to these ancient lavas, the following was given as a general definition:—The rock is generally of some shade of blue or dark green, generally weathering white round the edges, but to a very slight depth. It frequently assumes a tabular structure, the tabule being often curved, and breaks with a sharp conchoidal and flinty fracture. Silica, 59-61 per cent. Matrix generally crystalline, containing crystals of labradorite or oligoclase and orthoclase, porphyritically imbedded, round which the small crystalline needles seem frequently to have flowed; magnetite generally abundant, and augite tolerably so, though usually changed into a soft dark-green mineral; apatite and perhaps olivine as occasional constituents. Occasionally the crystalline base is partly obscured and a felsitic structure takes its place. The Cumberland lavas were shown to resemble the Solfatara greystone in the frequent flow of the crystalline base, and the modern lavas generally in the order in which the various minerals crystallised out. In external structure they have, for the most part, much more of a felsitic than a basaltic appearance. In internal structure they have considerable analogies with the basalts. In chemical composition they are neither true basalts nor true felstones. In petrological structure they have much the general character of the modern Vesuvian lavas; the separate flows being usually of no great thickness, being sluggy, vesicular, or brecciated at top and bottom, and having often a considerable range, as if they had flowed in some cases for several miles from their point of eruption. Their general microscopic appearance is also very different from that of such old basalts as those of South Stafford and some of those of Carboniferous age in Scotland. On the whole, while believing that in some cases the lavas in question were true basalts, the author was inclined to regard most of them as occupying an intermediate place between felsitic and doleritic lavas; and as the felstone-lavas were once probably trachytes, these old Cumbrian rocks might perhaps be called felsidolerites, answering in position to the modern Trachydolerites. A detailed examination of Cumbrian ash-rocks had convinced the author that in

many cases most intense metamorphism had taken place, that the finer ashy material had been partially melted down, and a kind of streaky flow caused around the larger fragments. There was every transition from an ash-rock in which a bedded or fragmentary structure was clearly visible, to an exceedingly close and flinty felstone-like rock, undistinguishable in hand specimens from a true contemporaneous trap. Such altered rocks were, however, quite distinct in microscopic structure from the undoubted lava-flows of the same district, and often distinct also from the Welsh felstones, although some were almost identical microscopically with the highly altered ashes of Wales, and together with them resembled the felstone-lavas of the same country. This metamorphism among the Cumbrian rocks increases in amount as the great granitic centres are approached; and it was believed by the author that it took place mainly at the commencement of the Old Red period, when the rocks in question must have been buried many thousands of feet deep beneath the Upper Silurian strata, and when probably the Eskdale granite was formed, perhaps partly by the extreme metamorphism of the volcanic series during upheaval and contortion. The author stated his belief that the Cumbrian volcanoes were mainly subaerial, since some 12,000 ft. of ash- and lava-beds had been accumulated without any admixture of ordinary sedimentary material, except quite at the base, containing scarcely any conglomeratic beds, and destitute of fossils. He believed also that one of the chief volcanic centres of the district had been the present site of Kenwick, the low craggy hill called Castle Head representing the denuded stump or plug of an old volcano. The author believed that one other truth of no slight importance might be gathered from these investigations, viz., that neither the careful inspection of hand specimens nor the microscopic examination of thin slices would in all cases enable truthful results to be arrived at, in discriminating between trap and altered ash-rocks; but these methods and that of chemical analysis must be accompanied by oftentimes a laborious and detailed survey of the rocks in the open country, the various beds being traced out one by one and their weathered surfaces particularly noticed.

Physical Society, Nov. 7.—Prof. W. G. Adams, F.R.S., in the chair.—A paper by Mr. G. F. Rodwell was read, on an instrument for multiplying small motions. It consists of a train of multiplying wheels, the first of which is moved by the bar whose elongation is to be measured, while the teeth of the last engage with the threads of an endless screw whose axis is vertical, and carries at its extremity a long index moving over a graduated circle. The multiplying power of the instrument is very great; its defects are its want of steadiness, great internal strain, and the difficulty of bringing the index back to zero when the pressure on the lever connected with the first wheel is removed.—Prof. Foster, F.R.S., made a communication on the geometrical treatment of certain elementary electrical problems. The object of this communication was to illustrate the facility and clearness by which certain of the electrical problems occurring in elementary instruction could be treated by easy geometrical methods. Its application was shown in the following cases: The calculation of the quantity of heat evolved in a galvanic circuit; the calculation of the electromotive force and of the permanent resistance of a voltaic battery from two deflections of a tangent-galvanometer; the determination of the joint resistance of several conductors combined in multiple-arc; and the determination of the distribution of potential and strength of the currents formed by connecting the similar poles of two unequal batteries with the opposite ends of the same conductor.—Prof. Guthrie read a paper on salt solutions and water of crystallisation. The absorption of heat which occurs when a salt is dissolved in a liquid was shown to depend not only on the relative specific heats of the salt and the liquid, but also on the molecular ratio of the resulting solution. This ratio declared itself optically (1) by the singularity of the refractive index when the critical ratio was obtained, (2) by the singularity of density at the same point, (3) by the heat absorbed when (a) a saturated solution was mixed with the medium, and (b) when the salt itself was dissolved in a certain quantity of the medium. The condition of maximum density of water was referred to the existence of a definite hydrate of water. It was shown that every salt soluble in water was capable of uniting with water in a definite ratio (by weight), forming definite solid compounds of distinct crystalline form and constant melting and solidifying points. It was supposed that the ratios of such union are not incommensurable with the ratios of chemical weight, and that the new class of bodies which only exist below

0° C., and may be called *cryohydrates*, are not discontinuous with the hydrated crystalline salts previously known. A few cryohydrates were described as being obtained from the saturated aqueous solutions of the respective salts on the withdrawal of heat. Thus chloride of sodium combines with 10.5 (210) molecules of water, and solidifies therewith at -23° C. Chloride of ammonium combines with 12 molecules of water, and solidifies at -15° C. The combinations with water were given of the sulphates of zinc, copper sodium, and magnesium, also those of the nitrates of potassium, chlorate of potassium, and bichromate of potassium. As far as experimental results at present indicate, it appears that those cryohydrates which have the lowest solidifying point have the least water. Some suggestions were offered concerning the application of these experimental results to the explanation of the separation of the Plutonic rocks from one another, and the importance was pointed out of the use which these cryohydrates will have in establishing constant temperatures below 0° as fixed and as readily obtainable as 0° itself.

Mathematical Society, Nov. 12.—Dr. Hirst, F.R.S., president, in the chair.—The President informed the meeting of the loss the Society had sustained by the recent death of one of its honorary foreign members, Dr. Otto Hesse, of the Polytechnicum, Munich, and mentioned that it was the intention of the Council soon to fill up the vacancies caused by the deaths of Drs. Clebsch and Hesse. —On the motion of Prof. Cayley, F.R.S., seconded by the Rev. R. Harley, F.R.S., it was ordered that the cordial thanks of the Society be presented to Lord Ryleigh for his munificent donation of 1,000*l.* to the Society, and the chairman was requested to convey the same by letter to his lordship. —The money has been vested, as the treasurer's report mentioned, in 870*l.* Guaranteed Indian Railway Stock, and the interest will be applied, as was stated two or three months since in NATURE, to the purchase of mathematical journals, and also to assist in defraying the expense of printing the Society's Proceedings. The meeting then proceeded to the election of the new Council, and the gentlemen whose names were given in a recent number of this journal were declared by the scrutators to be duly elected. —Instead of giving the usual valedictory address, Dr. Hirst stated what results he had arrived at in the course of his investigations upon "Correlation in Space." The communication was an extension to space of results arrived at in his paper (read before the Society in May last), entitled the "Correlation of Two Planes." —Mr. J. H. Röhrs read an abstract of a communication on "Tidal Retardation." The problem discussed is the superior limit to the tidal retardation in a globe, in all respects similar to our own, except that it is covered entirely by a sea, the depth of which is constant for all places in the same latitude, and is therefore a function of latitude only—not longitude—a function supposed to be known. —A paper by Prof. Wolstenholme on a new view of the porism of the in- and circumscribed triangle was taken as read.

Anthropological Institute, Nov. 10.—Prof. Busk, F.R.S., president, in the chair.—Reports were read by Mr. F. W. Rudler on the Anthropological Department of the British Association at Belfast, and by Mr. Hyde Clarke on the Anthropological Section of the International Congress of Orientalists recently held in London. —A paper was then read by Col. Lane Fox on a series of flint and chert arrow-heads and flakes from the Rio Negro, Patagonia, with some remarks on the stability of form observable in stone implements. The series of specimens exhibited was selected from a collection of 500 gathered by Mr. W. H. Hudson on the margin of the river and over an extent of about ninety miles, and on the numerous lagoons, now mostly dry, with which the valley is everywhere intersected. The valleys in that region run through high-terraced table-lands; and on the plateaus above there is no water and but very scanty vegetation, which would seem to indicate the improbability of their having been occupied by man. A great number of the implements were discovered by Mr. Hudson on the sites of villages in the valley and in circular flattened mounds of clay measuring from 6 ft. to 8 ft. in circumference. The different styles of workmanship observed in the different villages were not, in the opinion of Mr. Hudson, to be attributed to the variety of material employed, but to the degree of skill possessed by the inhabitants of each village. The author drew attention to the interesting fact of the arrow-heads having long fallen into disuse among the Tehuelches and other Patagonian tribes, who now and for some centuries past employed the spear. Col. Fox proceeded to describe in detail the various weapons and their varieties of workmanship, and showed that they all presented the same general features as

implements found in the United States. He believed that, owing to our inability to understand the uncultured mental condition of savages and prehistoric races, we often lose sight of the inferences deducible from the stability of form observable in their arts and implements, and attach less importance than should be the case to minute varieties of structure.—It was announced that the Council had resolved to publish in the Journal of the Institute bibliographical notices, abstracts and reviews of English and foreign works and papers, and other miscellaneous matter of anthropological interest and importance.

PARIS

Academy of Sciences, Nov. 2.—M. Bertrand in the chair. —The following papers were read:—General results of observations on the germination and first developments of different lilies, by M. P. Duchartre.—Researches on the dissociation of crystalline salts, by MM. P. A. Favre and C. A. Valsen.—Results of the voyage of exploration undertaken for the preliminary study of the general track of a railway connecting the Anglo-Indian with the railways of Russian Asia, by M. F. de Lesseps.—Rational treatment of pulmonary phthisis, by M. P. de Pietra Santa.—On new apparatus for studying the phenomena of the combustion of powders, by MM. Marcel-Deprez and H. Sebert.—Theory of electrodynamics freed from all hypotheses relating to the mutual action of two current elements, by M. P. Le Cordier.—Monograph of the anguilliform family of fishes, by M. C. Dareste.—On the existence of a sexual generation in *Phylloxera vastatrix*, by M. G. Balbiani.—On the solution of numerical equations of which all the roots are real, by M. Laguerre.—On an apparatus for determining personal equations in observations of the transit of stars, arranged for the geodesic service of the United States, by MM. Hilgard and Suess.—On the laws of the vibratory motion of tuning-forks, by M. E. Mercadier.—Note on a modification of Fehling's and Barreswil's solutions for the determination of glucose, by M. P. Lagrange.—On the fermentation of fruits, by MM. G. Lechartier and F. Belamy. The authors have now examined the products from cherries, gooseberries, and figs.—Application of the graphical method to the study of certain points in deglutition, by M. S. Arloing. The author concludes from his experiments that a decided difference exists between the swallowing of liquids and of solids.—On the mechanism of deglutition, by M. G. Carlet.—Results furnished by surgical operations performed on patients in which anaesthesia has been produced by the intravenous injection of chloral, by M. Oré.—Note on a cyclone observed at La Pouéze (Maine-et-Loire) Sept. 30, 1874, at 4.30 P.M., by M. Al. Jeanjen.—The Report of the Commission appointed on August 17 for preparing a reply to the letter addressed by the Minister of Public Instruction concerning the organisation of a Physical Astronomical Observatory in the neighbourhood of Paris, was read at the conclusion of the meeting.

BOOKS RECEIVED

BRITISH.—Meteorological Committee (Her Majesty's Stationery Office).—Beauty in Common Things, by the author of "Life Underground" (Society for the Promotion of Christian Knowledge).
AMERICAN.—Monthly Report of Department of Agriculture, October 1874 (Washington, U.S.).
COLONIAL.—Red Corpuscles of the Blood: R. H. Bakewell, M.D. (Mills, Dick, and Co., Otago, N.Z.).—Centrifugal Force and Gravitation: John Harris (John Lovell, Montreal).—Prodromus of the Palaeontology of Victoria (Australia): John Ferris (Melbourne).

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